DETAILED ACTION

Response to Amendment

The amendment, filed 6/16/2011, has been entered and made of record. Claims 24-26,28,31-39 and 42-48 are pending in the application.

Response to Arguments

Applicant's arguments regarding independent claims 24,34 and 39 and the Chen et al. in view of Nagaya et al. and Foran et al. rejection have been fully considered but they are not persuasive.

Applicant agues in regard to the cited prior art of record, "There is no disclosure in either Foran et al. or Nagaya et al. of displaying subsets of selected plurality of frames across a series of time slots, or "displaying at least a subset of the selected plurality of subsets of frames from the in-vivo image stream substantially simultaneously in each time slot, wherein the frames of the displayed subset of frames are positioned spatially in order of ascending or descending degree of variation based on the at least one score assigned thereto, wherein in each time slot a different subset of frames is displayed…" The examiner respectfully disagrees with this assertion. Specifically, Foran et al. discloses in column 18, Lines 7-9 that matched workspaces can be displayed in order of similarity to the reference frame. The examiner submits that this can be broadly interpreted as "displayed subset of frames are positioned spatially in order of ascending or descending degree of variation". As to the amendment to the independent claims in this response, the examiner submits that Nagaya et al. teaches the limitation, "...wherein in each time slot a different subset of frames is displayed…" Specifically, Nagaya et al. teaches the

display of a plurality of representative images which were captured during a specific time period. The display can be manipulated such that representative images are displayed simultaneously within a specific time period (Figure 9, Col. 16, Lines 38-50). From this disclosure, it is inherent that images captured and displayed within one time period will be different from an image captured and displayed within another time period. Accordingly, the examiner submits that the Nagaya et al. teaches the limitation at issue and the rejection of independent claims 24,34 and 39 stands.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 24-26,28,33-37,39,43 and 45-48 rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2005/0075537) in view of Nagaya et al. (US # 6,741,977) and further in view of Foran et al. (US # 7,027,633).

As to claim **24**, Chen et al. teaches a method for displaying frames from an in-vivo image stream (Figure 4, CRT display "404"), the image stream comprising a series of frames captured in-vivo in a chronological order ([0028], Lines 3-5), said method comprising: for a subset of images, assigning at least one score to each frame of the subset based on a degree of variation ([0036]; *{The examiner interprets a score as a match or not.}*) of a predetermined criterion ([0036], Lines 1-3, "…Image features such as color, texture...") of each frame ([0036], Lines 3-5, "…segmented regions of the GI tract image…") and a predetermined criterion of a reference frame (Figure 4, predetermined templates "534"; [0036], Lines 7-9). The claim differs from Chen et al. in that it requires the step of selecting a plurality of subsets of frames from the in-vivo images stream for display across a series of time slots, wherein in each time slot a different subset of frames is displayed (1). Chen et al. also does not detail how the in-vivo GI tract images are displayed. In this regard, Chen et al. fails to disclose the step of displaying, across the series of time slots, at least a subset of the selected plurality subsets of frames from the in-vivo stream substantially simultaneously in each time slot, wherein the frames of the displayed subset of frames are positioned spatially in order of ascending or descending degree of variation based on the at least one score assigned thereto (2).

In the same field of endeavor, Nagaya et al. teaches a method for displaying a plurality of images from a monitored area. The method includes a step of providing a display system wherein a plurality of subsets of frames can be selected and displayed simultaneously across a series of

time slots, wherein in each time slot a different subset of frames is displayed (1) (Figure 9). In light of the teaching of Nagaya et al., it would have been obvious to one of ordinary skill in the art to include the feature, in the system of Chen et al., of displaying simultaneously a subset of frames across a series of time slots, because an artisan of ordinary skill in the art would recognize that this would allow the captured images of Chen et al. to be displayed efficiently and multi-laterally (see Nagaya et al., Col. 5, Lines 15-19).

Further in the same field of endeavor, Foran et al. teaches a collaborative diagnostic system including tools for computer-assisted evaluation of objective characteristics of pathologies (Figures 4 and 5). The system includes a computer workstation including a user interface (Figure 6, user interface "600") which displays substantially simultaneously matched images (Figure 6, matched images "608") along with metadata (Figure 6, "Retrieval 1…", "Retrieval 2…", etc.) in order of similarity (Col. 18, Lines 4-9) to a reference frame (Figure 6, image "602") (2). In light of the teaching of Foran et al., it would have been obvious to one of ordinary skill in the art to include the ability to display the subset of images matching the predetermined templates along with the metadata of Chen et al., as modified by Nagaya et al., in the manner of Foran et al., because this would allow for improved diagnostic accuracy and early detection for pathologies (see Foran et al., Col. 2, Lines 20-23).

As to claim **25**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 comprising displaying the in-vivo image stream as a multi-frame image stream (see Chen et al., Figure 4; see Foran et al., Figure 6).

As to claim **26**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 25 comprising adjusting a rate at which the multi-frame image stream

is displayed based on the content of the frames (see Chen et al., [0046]; *{The image stream is adjusted by thresholding the color feature matching. Without the color feature detection, all images of the in vivo stream will be displayed.}*).

As to claim **28**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 wherein the score is assigned based on a degree of color variation of the displayed frames as compared to the reference frames (see Chen et al., [0036]).

As to claim **33**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 comprising displaying sensor data from a sensor other than an image sensor substantially simultaneously as the frames from the in-vivo image stream (see Chen et al., Figure 2A; [0030]).

As to claim **34**, Chen et al. teaches a system for displaying frames of an in vivo image stream (Figure 4, CRT display "404"), the image stream comprising a series of frames captured in-vivo in a chronological order ([0028], Lines 3-5), the system comprising: an in-vivo imaging device (Figure 1, capsule "112"; [0034], Lines 4-7) to transmit an in-vivo image stream (Figure 1, image transmitter "106"); a processor (Figure 4, examination bundlette processor "402") to assign at least one score to each frame of a subset of frames based on a degree of variation ([0036]; *{The examiner interprets a score as a match or not.}*) between a predetermined criterion ([0036], Lines 1-3, "…Image features such as color, texture...") of each frame ([0036], Lines 3-5, "…segmented regions of the GI tract image…") and a predetermined criterion of a reference frame (Figure 4, predetermined templates "534"; [0036], Lines 7-9). The claim differs from Chen et al. in that it requires that the processor select a plurality of subsets of frames from the in-vivo images stream for display across a series of time slots, wherein in each time slot a different

subset of frames is displayed (1). Chen et al. also does not detail how the in-vivo GI tract images are displayed. In this regard, Chen et al. fails to disclose a display to display, across the series of time slots, at least a subset of the selected plurality subsets of frames from the in-vivo stream substantially simultaneously in each time slot, wherein the frames of the displayed subset of frames are positioned spatially in order of ascending or descending degree of variation based on the at least one score assigned thereto (2).

In the same field of endeavor, Nagaya et al. teaches a method for displaying a plurality of images from a monitored area. The method includes a step of providing a display system wherein a plurality of subsets of frames can be selected and displayed simultaneously across a series of time slots, wherein in each time slot a different subset of frames is displayed (1) (Figure 9). In light of the teaching of Nagaya et al., it would have been obvious to one of ordinary skill in the art to include the feature, in the system of Chen et al., of displaying simultaneously a subset of frames across a series of time slots, because an artisan of ordinary skill in the art would recognize that this would allow the captured images of Chen et al. to be displayed efficiently and multi-laterally (see Nagaya et al., Col. 5, Lines 15-19).

Further in the same field of endeavor, Foran et al. teaches a collaborative diagnostic system including tools for computer-assisted evaluation of objective characteristics of pathologies (Figures 4 and 5). The system includes a computer workstation including a user interface (Figure 6, user interface "600") which displays substantially simultaneously matched images (Figure 6, matched images "608") along with metadata (Figure 6, "Retrieval 1…", "Retrieval 2…", etc.) in order of similarity (Col. 18, Lines 4-9) to a reference frame (Figure 6, image "602") (2). In light of the teaching of Foran et al., it would have been obvious to one of

ordinary skill in the art to include the ability to display the subset of images matching the predetermined templates along with the metadata of Chen et al., as modified by Nagaya et al., in the manner of Foran et al., because this would allow for improved diagnostic accuracy and early detection for pathologies (see Foran et al., Col. 2, Lines 20-23).

As to claim **35**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the system of claim 34 wherein the in-vivo imaging device is an autonomous capsule (see Chen et al., Figure 1, capsule "112"; [0034], Lines 4-7, "…swallowed capsule…").

As to claim **36**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the system of claim 34 comprising a pH sensor (see Chen et al., [0030], Lines 9-15, "…non-image sensed characteristics such as pH…").

As to claim **37**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the system of claim 34 wherein the scores are assigned based on data detected by a sensor (see Chen et al., Figure 1, camera "104"; *{The match is determined by the image features which are captured by the camera.}*).

As to claim **39**, Chen et al. teaches a method for displaying frames from an in vivo image stream (Figure 4, CRT display "404"), the image stream comprising a series of frames captured in-vivo in a chronological order ([0028], Lines 3-5), the method comprising: transmitting an in-vivo image stream (Figure 3); for each of a subset of frames, assigning at least one score to each of a plurality of frames based on a degree of variation ([0036]; *{The examiner interprets a score as a match or not.}*) between a predetermined criterion ([0036], Lines 1-3, "…Image features such as color, texture...") of each frame ([0036], Lines 3-5, "…segmented regions of the GI tract image…") and a predetermined criterion of a reference frame (Figure 4, predetermined templates

"534"; [0036], Lines 7-9). Chen et al. does not detail how the in vivo GI tract images are displayed. In this regard, Chen et al. fails to disclose the step of displaying at least a subset of the plurality of frames from the in vivo stream substantially simultaneously, wherein the subset of frames are positioned spatially in order of ascending or descending degree of variation based on the scores assigned thereto (1). The claim further differs from Chen et al. in that it requires that the two or more reference frames are used to assign two or more scores (2).

The claim differs from Chen et al. in that it requires the step of selecting a plurality of subsets of frames from the in-vivo images stream for display across a series of time slots, wherein in each time slot a different subset of frames is displayed (1). Chen et al. also does not detail how the in-vivo GI tract images are displayed. In this regard, Chen et al. fails to disclose the step of displaying, across the series of time slots, at least a subset of the selected plurality subsets of frames from the in-vivo stream substantially simultaneously in each time slot, wherein the frames of the displayed subset of frames are positioned spatially in order of ascending or descending degree of variation based on the at least one score assigned thereto (2).

In the same field of endeavor, Nagaya et al. teaches a method for displaying a plurality of images from a monitored area. The method includes a step of providing a display system wherein a plurality of subsets of frames can be selected and displayed simultaneously across a series of time slots, wherein in each time slot a different subset of frames is displayed (1) (Figure 9). In light of the teaching of Nagaya et al., it would have been obvious to one of ordinary skill in the art to include the feature, in the system of Chen et al., of displaying simultaneously a subset of frames across a series of time slots, because an artisan of ordinary skill in the art would

recognize that this would allow the captured images of Chen et al. to be displayed efficiently and multi-laterally (see Nagaya et al., Col. 5, Lines 15-19).

Further in the same field of endeavor, Foran et al. teaches a collaborative diagnostic system including tools for computer-assisted evaluation of objective characteristics of pathologies (Figures 4 and 5). The system includes a computer workstation including a user interface (Figure 6, user interface "600") which displays substantially simultaneously matched images (Figure 6, matched images "608") along with metadata (Figure 6, "Retrieval 1…", "Retrieval 2…", etc.) in order of similarity (Col. 18, Lines 4-9) to a reference frame (Figure 6, image "602") (2). In light of the teaching of Foran et al., it would have been obvious to one of ordinary skill in the art to include the ability to display the subset of images matching the predetermined templates along with the metadata of Chen et al., as modified by Nagaya et al., in the manner of Foran et al., because this would allow for improved diagnostic accuracy and early detection for pathologies (see Foran et al., Col. 2, Lines 20-23).

As to claim **43**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 39 wherein the score is assigned based on color variation of the plurality of frames as compared to the reference frames (see Chen et al., [0036] and Adler et al., [0027], Lines 1-5, "…color components…").

As to claim **45**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 wherein the reference frame represents a pathology (see Chen et al., [0036], Lines 7-9, "…statistical representations of GI tract abnormalities…") and wherein frames having a low degree of variation with respect to the pathology reference frame (see Chen

et al., [0036], Lines 9-13, matches have low degrees of variation) are displayed (see Foran et al., Figure 6, matched images "608").

As to claim **46**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 comprising selecting or generating the reference frame (see Chen et al., Figure 6, predetermined templates are generated somehow).

As to claim **47**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 46 wherein selecting or generating the reference frame is based on the frame to be displayed (see Chen et al., [0036]; *{The system generates the predetermined templates of the GI tract due to the fact that the displayed frames are taken in the GI tract.}*).

As to claim **48**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24 wherein the predetermined criterion is selected from the group consisting of: color (see Chen et al., [0036], Lines 1-3, "…Image features such as color..."), shape features, focusing, lighting, blood detection, and image content which may not be associated with a pathology.

2. Claim 31 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2005/0075537) in view of Nagaya et al. (US # 6,741,977) in view of Foran et al. (US # 7,027,633) and further in view of Balabanovic et al. (US # 6,976,229).

As to claim **31**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24. The claim differs from Chen et al., as modified by Nagaya et al. and Foran et al., in that it further requires the step of adjusting the size of at least one of the frames displayed based on the assigned score.

In the same field of endeavor, Balabanovic et al. teaches a method of displaying image frames wherein a user can select an image frame from a plurality of grouped images in order to enlarge the frame for viewing (Figure 1, large image "120" and thumbnail images of tracks "105", “110” and "115"). In light of the teaching of Balabanovic et al., it would have been obvious to one of ordinary skill in the art to include the ability to enlarge a displayed image in the system of Foran et al., because an artisan of ordinary skill in the art would recognize that this would allow a physician to get a better view of a potentially abnormal frame of the GI tract.

As to claim **42**, Chen et al., as modified by Nagaya et al., Foran et al. and Balabanovic et al., teaches the method according to claim 39 wherein at least two of the plurality of frames are displayed having different sizes (see Balabanovic et al., Figure 1, large image "120" and thumbnail images of tracks "105", “110” and "115").

3. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2005/0075537) in view of Nagaya et al. (US # 6,741,977) in view of Foran et al. (US # 7,027,633) and further in view of Shibanuma (US # 5,642,157).

As to claim **32**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24. The claim differs from Chen et al., as modified by Nagaya et al. and Foran et al., in that it further requires that the in-vivo image stream includes frames captured from more than one image sensor.

In the same field of endeavor, Shibanuma teaches a system including an endoscope apparatus used in combination with another medical diagnostic imaging device in which video signals from both devices can be displayed simultaneously or can be switched between on a

display device (Figures 5A and 5B; Col. 2, Lines 44-52). In light of the teaching of Shibanuma, it would have been obvious to one of ordinary skill in the art to include the ability to display multiple frames from multiple sensors in the system of Chen et al., as modified by Nagaya et al. and Foran et al., because this would allow for an improved image display technique (see Shibanuma, Col. 1, Lines 7-11)

4. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2005/0075537) in view of Nagaya et al. (US # 6,741,977) in view of Foran et al. (US # 7,027,633) and further in view of Iddan et al. (US # 6,764,440).

As to claim **38**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the system of claim 34. The claim differs from Chen et al., as modified by Nagaya et al. and Foran et al., in that it further requires that the processor is to adjust the stream rate of the multi-frame image stream.

In the same field of endeavor, Iddan et al. teaches a method for energy management of a video capsule wherein in order to save power; and consequently, reduce a stream rate of captured images, a control unit discontinues the power supply of the capsule in order to prevent the capture of redundant images according to the axial movement of the capsule (Figures 1 and 2; Col. 3, Lines 7-17). In light of the teaching of Iddan et al., it would have been obvious to one of ordinary skill in the art to include this energy management method in the system of Chen et al., because an artisan of ordinary skill in the art would recognize that this would save power and, by reducing the capture of redundant images, allow for better diagnostics as redundant images may lead a physician to confusion.

5. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 2005/0075537) in view of Nagaya et al. (US # 6,741,977) in view of Foran et al. (US # 7,027,633) and further in view of Bille (US 2005/0110948).

As to claim **44**, Chen et al., as modified by Nagaya et al. and Foran et al., teaches the method according to claim 24. The claim differs from Chen et al., as modified by Nagaya et al. and Foran et al., in that it further requires that the reference frame represent healthy tissue and wherein frames having a high degree of variation with respect to the healthy tissue reference frame are displayed to represent pathologies.

In the same field of endeavor, Bille teaches an imaging system for diagnostically evaluating the health of tissue, wherein an in vivo image of tissue is acquired and compared to a template representing healthy tissue (Figure 1; Col. 6, Lines 27-35). In light of the teaching of Chen et al., as modified by Nagaya et al. and Foran et al., it would have been obvious to one of ordinary skill in the art to use healthy normal GI tract images as templates when performing feature matching in the system of Chen et al., because as a supplement, this would provide allow higher quality abnormality detection and by itself, may be more appropriate for abnormality detection in different lighting situations.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. DANIELS whose telephone number is (571)272-7362. The examiner can normally be reached on 8:00 A.M. - 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ANTHONY J DANIELS/
Examiner, Art Unit 2622
8/25/2011